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Lewis Research Center



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Improved Transmittance Measurements with a Magnesium Oxide Coated Integrating Sphere

A simple and convenient technique has been found for extending the transmittance measurement capability of a conventional magnesium oxide coated integrating sphere system at low (near ultraviolet) wavelengths. The technique is to place a sodium salicylate-coated disk in the center of the integrating sphere. With the coated disk, the detector output is increased, and accurate transmittance measurements can be made to wavelengths of 0.25 micrometer with a tungsten lamp and to 0.22 micrometer with a deuterium lamp. Previous transmittance measurements had been limited to wavelengths of 0.32 and 0.26 micrometer, respectively, due to low signal levels, system instabilities, and electronic noise.

In use, the sodium salicylate-coated disk intercepts the radiant beam before it strikes the magnesium oxide coated sphere wall, and causes the sodium salicylate to fluoresce. The sodium salicylate fluorescence (centered about 0.435 micrometer) is at a wavelength of high magnesium oxide reflectance and increased detector (photomultiplier) sensitivity. The resulting effect is a gain in the detector output. The gain is a factor of two at a wavelength of 0.27 micrometer when the conventional spectrometer source (1 kW tungsten lamp) is used. With a deuterium lamp, the signal gain is as high as six at the short wavelengths. The increased detector output makes it possible to obtain accurate transmittance data for the shorter wavelengths without disrupting the transmittance measuring capability at the longer (visible and near infrared) wavelengths.

Notes:

1. This technique was developed for making transmittance measurements to determine the effect of contaminants on window materials. It can also be used for measurements on thermal control coatings and telescope mirrors.
2. The following documentation may be obtained from:
National Technical Information Service
Springfield, Virginia 22151
Single document price \$3.00
(or microfiche \$0.95)

Reference: NASA TM-X-2395 (N71-35856),
Improved Transmittance Measurements in a
Magnesium Oxide Coated Integrating Sphere
3. Technical questions may be directed to:
Technology Utilization Officer
Lewis Research Center
21000 Brookpark Road
Cleveland, Ohio 44135
Reference: B72-10717

Patent status:

NASA has decided not to apply for a patent.

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